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ABSTRACT

A means now exists which allows the authors of computer-assisted instructional (CAI) programs to enter new exercises into the computer even if they possess only a minimum of expertise about computers and programing. The routine, called Journalism Computer Assisted Instruction (JCAI), is used for computer analysis of student writing in journalism and English courses. JCAI scans the student's written text for patterns specified by the author. These patterns may be single words, phrases, numbers, or other symbols. Based upon the presence or absence of these patterns and their location, the program comments about the accuracy, style, and other strengths and weaknesses of the student's writing. Preparation of a JCAI program involves three steps: 1) making a list of all key words or patterns and the comments they evoke; 2) writing out in English the conditions for when the comments should appear; and 3) translating the conditions into if-then commands. A detailed example illustrating how JCAI operates is provided. (Author/PB)

ADAPTING COMPUTER-ASSISTED-INSTRUCTION TO THE NON-PROGRAMMER

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One of the major disadvantages of computer-assisted instruction is the necessity for programming. Either the CAI author must learn to do his own programming, or he must find the money to pay for programming assistance. And, more often than not, the programmer must learn a whole new approach before he can be of much help, especially in such fields as natural language analysis.

For several years we have been using computer analysis of student writing as an aid to journalism and English composition classes, and have found the teacher-machine interface a major hindrance. Now we have developed a program, largely through the efforts of Darien Gardner, which allows us to enter a new exercise with only a minimum of computer knowledge. The sample story at the end of this paper, for example, was entirely programmed by Mrs. Bishop at a time when she had no exposure to computers. The process, including debugging, took only six hours.

This routine, called Journalism Computer Assisted Instruction (JCAI), scans any text for patterns specified by the author. Patterns may be single words, a hyphenated word, a phrase, a number, or any other symbol. Based upon the presence or absence of these patterns and their location within the material, the program makes comments about the strong and weak points in the student exercise. A comment could be on accuracy, style, redundancy, incomplete or incorrect source identification, omission of important details, grouping of like matter, spelling errors, the use of quotations, and so forth.

This project has been possible only through the financial support of the University of Michigan.

Preparing a story for the JCAI program consists of three steps: (1) making a list of all the key words or patterns and the comments they would evoke, (2) writing out in English the conditions when the comments should appear, and (3) translating the conditions into IF-THEN commands.

The general form for the logic statements, or the IF-THEN commands is:

IF _____ appears, THEN comment: _____

IF _____ does not appear, THEN comment: _____

IF _____, _____, and _____ appear, THEN comment: _____

IF _____, _____, or _____ appears, THEN comment: _____

IF _____, _____, but not _____ appear, THEN comment: _____

IF in a (paragraph or sentence) containing the word _____,

_____ appears, THEN comment: _____

IF in a (paragraph or sentence) containing the word _____,

_____ does not appear, THEN comment: _____.

The last two examples are simply a way of directing the program to look for patterns in a particular sentence or paragraph. Any of the models may be worded in this way. The program may be directed to search in the first paragraph, the first sentence, the first _____ words, the second paragraph, the second sentence, words _____ to _____, the last paragraph, the last two sentences, or the last _____ words.

1. If 'ACHIEVE A MAXIMUM VELOCITY OF' appears, then comment: "REPORT THE WEATHER CONDITIONS MORE SUCCINCTLY. USE SYNONYMS FOR SUCH PHRASES AS 'ACHIEVE A MAXIMUM VELOCITY OF.'"

2. If 'USS ' appears but neither 'USS AMMAN' nor 'USS COLLETT' appears, then comment: "USS STANDS FOR UNITED STATES SHIP. THEREFORE, IT IS USED ONLY AS PART OF A NAME, E.G. USS AMMAN."

3. If 'NEWPORT BEACH' does not appear in the first 30 words, then comment: "BE SURE TO REPORT NEAR THE BEGINNING OF THE STORY WHERE THE ACCIDENT OCCURRED."

4. If neither 'TODAY' nor 'THIS MORNING' appears in the first paragraph, then comment: "BE SURE TO REPORT NEAR THE BEGINNING OF THE STORY WHEN THE ACCIDENT OCCURRED."

5. If 'AMMAN' and 'COLLETT' and 'LONG BEACH' and either 'THREE' or ' 3' appear in the first 50 words, then comment: "GOOD. YOU HAVE IDENTIFIED THE DESTROYERS BY NAME, BASE AND FLOTILLA NUMBER EARLY IN THE STORY. THIS IS IMPORTANT TO READERS WITH RELATIVES OR FRIENDS WHO MAY HAVE BEEN IN THE ACCIDENT."

6. If 'FROM', 'AFTER' or 'FOLLOWING' appears in the same sentence with 'BRAIN SURGERY', then comment: "ONE OF THE MOST SENSITIVE AREAS IN AN OBITUARY IS THE CAUSE OF DEATH. IF IT IS NOT KNOWN AND CANNOT BE LEARNED, AVOID IMPLYING THE CAUSE."

7. If 'ERNEST' or 'JOHN E' and 'JOSEPHINE' do not appear in the same sentence with 'PARENTS', then comment: "IT IS CUSTOMARY TO INCLUDE THE NAMES OF THE PARENTS OF THE DECEASED, IF KNOWN. HAVE YOU SPELLED THEM CORRECTLY?"

8. If 'TRANSPORTATION' or 'PLANNED' appears without quotation marks, then comment: "NEWSPAPER STYLE IS TO USE QUOTATION MARKS AROUND BOOK TITLES. CHECK AP STYLE BOOK, IF IN DOUBT."

9. If ' #' or '30' or ' END' does not appear in the last three words, then comment: "HAVE YOU FINISHED THIS STORY? I DON'T SEE THE END MARK."

10. If ' #' or '30' or ' END' does appear in the last three words, then comment: "THANK YOU FOR MARKING THE END OF YOUR STORY."

11. After the other comments, comment: "IF THIS WERE YOUR OWN OBIT, WOULD YOU BE SATISFIED WITH IT? IF NOT, WHY?"

12. If the story exceeds 150 words in length, then comment: "ARE YOU SURE YOU CAN'T FURTHER SHORTEN YOUR STORY? READ IT CAREFULLY TO SEE IF THERE ARE UNNECESSARY WORDS OR DETAILS YOU CAN OMIT. TRY AGAIN TO CUT IT TO 150 WORDS OR LESS."

How do you specify the IF-THEN commands for each one of the examples above? Let us take them in order.

1. PATTERN 1: 'ACHIEVE A MAXIMUM VELOCITY OF'

COMMENT 1: REPORT THE WEATHER CONDITIONS MORE SUCCINCTLY. USE SYNONYMS FOR SUCH PHRASES AS 'ACHIEVE A MAXIMUM VELOCITY OF.'

ENGLISH: If 'ACHIEVE A MAXIMUM VELOCITY OF' appears, then make comment 1.

LOGIC: IF 1 THEN 1

The patterns and comments are referred to by number. The two occurrences of "1" here cause no confusion because the pattern numbers always come between the 'IF' and the 'THEN' while the comment number always follows the 'THEN'.

2. PATTERN 2: 'USS '
PATTERN 3: 'USS AMMAN'
PATTERN 4: 'USS COLLETT'

COMMENT 2: USS STANDS FOR UNITED STATES SHIP. THEREFORE, IT IS USED ONLY AS PART OF A NAME, E.G. USS AMMAN.

ENGLISH: If 'USS ' appears but neither 'USS AMMAN' nor 'USS COLLETT' appears, then make comment 2.

LOGIC: IF 2, -3, -4 THEN 2

A minus sign in front of a pattern number means "does not appear." The intention is to catch the error in "THE USS SHIPS AMMAN AND COLLETT COLLIDED..." instead of "THE SHIPS USS AMMAN AND USS COLLETT COLLIDED..." Note that 'USS ' consists of four characters: 'U', 'S', 'S', and ' '.

3. PATTERN 5: 'NEWPORT BEACH'

COMMENT 3: BE SURE TO REPORT NEAR THE BEGINNING OF THE STORY WHERE THE ACCIDENT OCCURRED.

ENGLISH: If 'NEWPORT BEACH' does not appear in the first 30 words, then make comment 3.

LOGIC: WORDS(1, 30): IF -5 THEN 3

There are a variety of ways of specifying "near the beginning of the story," such as WORDS(1, 30) ("the first 30 words"), PARAGRAPH(1, 1) ("the first paragraph"), and SENTENCES(1, 3) ("the first three sentences").

4. PATTERN 6: 'TODAY'
PATTERN 7: 'THIS MORNING'

COMMENT 4: BE SURE TO REPORT NEAR THE BEGINNING OF THE STORY WHEN THE ACCIDENT OCCURRED.

ENGLISH: If neither 'TODAY' nor 'THIS MORNING' appears in the first paragraph, then make comment 4.

LOGIC: PARAGRAPH(1): IF -6, -7 THEN 4

PARAGRAPH(1) is understood by the program as equivalent to PARAGRAPH(1, 1). Similarly SENTENCE (2, 2) ("the second sentence") can also be written SENTENCE(2). WORD(20, 20) ("the 20th word) can also be written WORD(20).

5. PATTERN 8: 'AMMAN'
PATTERN 9: 'COLLETT'
PATTERN 10: 'LONG BEACH'
PATTERN 11: 'THREE'
PATTERN 12: ' 3'

COMMENT 5: GOOD. YOU HAVE IDENTIFIED THE DESTROYERS BY NAME, BASE AND FLOTILLA NUMBER EARLY IN THE STORY. THIS IS IMPORTANT TO READERS WITH RELATIVES AND FRIENDS WHO MAY HAVE BEEN IN THE ACCIDENT.

ENGLISH: If 'AMMAN' and 'COLLETT' and 'LONG BEACH' and either 'THREE' or ' 3' appear in the first 50 words, then make comment 5.

LOGIC: WORDS(1, 50): IF 8, 9, 10, 11 THEN 5
WORDS(1, 50): IF 8, 9, 10, 12 THEN 5

This type of logic specification requires more than one line of logic. In this case 'AMMAN', 'COLLETT' and 'LONG BEACH'

must all appear, but 'THREE' and ' 3' are to be accepted as alternates. In effect, the logic specification breaks this into two separate specifications: (1) If 'AMMAN' and 'COLLETT' and 'LONG BEACH' and 'THREE' all appear in the first 50 words, then make comment 5. (2) If 'AMMAN' and 'COLLETT' and 'LONG BEACH' and ' 3' all appear in the first 50 words, then make comment 5. If either one or the other of these conditions is satisfied, the comment will be made. The reason that putting separate specifications on different lines is equivalent to putting an "or" between them is that the "print" switch for comment 5 is set to "off" at the beginning of the program. If one of the pattern specifications turns it to "on," it remains "on."

6. PATTERN 13: 'FROM'
PATTERN 14: 'AFTER'
PATTERN 15: 'FOLLOWING'
PATTERN 16: 'BRAIN SURGERY'

COMMENT 6: ONE OF THE MOST SENSITIVE AREAS IN AN OBITUARY IS THE CAUSE OF DEATH. IF IT IS NOT KNOWN AND CANNOT BE LEARNED, AVOID IMPLYING THE CAUSE.

ENGLISH: If 'FROM', 'AFTER' or 'FOLLOWING' appears in the same sentence with 'BRAIN SURGERY', then make comment 6.

LOGIC:
```
SENTENCE(*16*): IF 13 THEN 6
SENTENCE(*16*): IF 14 THEN 6
SENTENCE(*16*): IF 15 THEN 6
```

You do not know beforehand in which sentence (or sentences) 'BRAIN SURGERY' will appear. As a solution to this difficulty, the JCAI program allows you to write SENTENCE(*16*) to designate the sentence (or sentences) in which pattern 16 ('BRAIN SURGERY') appears. Similarly PARAGRAPH(*16*) can be used to designate the paragraph (or paragraphs) in which pattern 16 appears.

7. PATTERN 17: 'ERNEST'
PATTERN 18: 'JOHN E'
PATTERN 19: 'JOSEPHINE'
PATTERN 20: 'PARENTS'

COMMENT 7: IT IS CUSTOMARY TO INCLUDE THE NAMES OF THE PARENTS OF THE DECEASED, IF KNOWN. HAVE YOU SPELLED THEM CORRECTLY?

ENGLISH: If 'ERNEST' or 'JOHN E' and 'JOSEPHINE' do not appear in the same sentence with 'PARENTS', then make comment 7.

LOGIC:
```
SENTENCE(*20*): IF -17, -18 THEN 7
SENTENCE(*20*): IF -19 THEN 7
```

This is an example of how the English language misleads and

confuses us. What is really meant here is that the parents of the deceased are Ernest (or John E.) Lansing and Josephine L. Lansing, and that both should be mentioned in the sentence containing the word "parents."

That seems clear enough. But the "or" in the phrase "'ERNEST' or 'JOHN E'" misleadingly suggests that the comment should be made when either 'ERNEST' or 'JOHN E' does not appear. Actually we mean that the comment should be made when both 'ERNEST' and 'JOHN E' do not appear:

SENTENCE(*20*): IF -17, -18 THEN 7

Similarly the "and" in the phrase "'ERNEST' or 'JOHN E' and 'JOSEPHINE'" misleadingly suggests that the comment should be made when the names of both parents are absent. Actually we want the comment to be made if the name of either parent is absent. So the logic specification can be split into two either-or parts: (1) If both 'ERNEST' and 'JOHN E' do not appear in the sentence containing 'PARENTS', then make comment 7. (2) If 'JOSEPHINE' does not appear in the sentence containing 'PARENTS', then make comment 7. This gives us:

SENTENCE(*20*): IF -17, -18 THEN 7
SENTENCE(*20*): IF -19 THEN 7

CHECKING PROCEDURE. If you are not sure whether the "and"s and "or"s are misleading or whether your logical specification is correct, there is an easy method of checking it. Simply list every possible combination of appearance or non-appearance of patterns in the form of a table, and put "yes" opposite the rows that should receive the comment and "no" opposite those that should not. For example, the three patterns for comment 7 are 17 ('ERNEST'), 18 ('JOHN E') and 19 ('JOSEPHINE'):

1.	17	18	19	no	
2.	17	18	-19	yes	
3.	17	-18	19	no	
4.	17	-18	-19	yes	TRUTH TABLE
5.	-17	18	19	no	
6.	-17	18	-19	yes	
7.	-17	-18	19	yes	
8.	-17	-18	-19	yes	

After you have done this, look to see whether the logic specification gives "yes" and "no" in the right places. When do both -17 and -18 occur? In rows 7 and 8. Check. When does -19 occur? In rows 2, 4, 6 and 8. Check. What about the remaining rows, 1, 3, and 5? They all have "no"s in the last column. Everything checks, so the logic specification is correct.

8. PATTERN 21: 'TRANSPORTATION'
PATTERN 22: '"TRANSPORTATION'
PATTERN 23: 'PLANNED'
PATTERN 24: '"PLANNED'

COMMENT 8: NEWSPAPER STYLE IS TO USE QUOTATION MARKS AROUND BOOK TITLES. CHECK AP STYLE BOOK, IF IN DOUBT.

ENGLISH: If 'TRANSPORTATION' appears but '"TRANSPORTATION' does not, or if 'PLANNED' appears but '"PLANNED' does not, then make comment 8.

LOGIC: IF 21, -22 THEN 8
IF 23, -24 THEN 8

"Transportation and Economic Policy" and "Planned Residential Environments" are the titles of books by the late John B. Lansing. Note that it is necessary to check for the presence of 'TRANSPORTATION' as well as the absence of '"TRANSPORTATION' (and the presence of 'PLANNED' as well as the absence of '"PLANNED'). This prevents the comment from being made inappropriately if the student fails to mention one of the books or misspells one of the titles.

Note also that 'POLICY"' and 'ENVIRONMENTS"' cannot be used as pattern words because of the punctuation that might go inside of the quotation marks, e.g., Policy.", Policy;", Policy," etc.

9. PATTERN 25: ' #'
PATTERN 26: '30'
PATTERN 27: ' END'

COMMENT 9: HAVE YOU FINISHED THIS STORY? I DON'T SEE THE END MARK.

ENGLISH: If ' #' or '30' or ' END' does not appear in the last three words, then make comment 9.

LOGIC: WORDS(L-2, L): IF -25, -26, -27 THEN 9

It is convenient to let "L" stand for the number of the last word in the text, since it cannot be known in advance. After counting the words in the student's story, JCAI will replace "L" by the number of the last word and "L-2" by the number of the third to last word, so that WORDS(L-2, L) means "in the last three words."

In the same fashion SENTENCES(L-1, L) can be used to designate the last two sentences, PARAGRAPH(L) to designate the last paragraph, etc.

This is another case where the use of "or" is misleading. Let us make a truth table:

1.	25	26	26	no	
2.	25	26	-27	no	
3.	25	-26	27	no	
4.	25	-26	-27	no	TRUTH TABLE
5.	-25	26	27	no	
6.	-25	26	-27	no	
7.	-25	-26	27	no	
8.	-25	-26	-27	yes	

It is quickly apparent that there is only one case in which the comment should be made: if ' #' and '30' and ' END' all do not appear in the last three words.

10. PATTERN 25: ' #'
PATTERN 26: '30'
PATTERN 27: ' END'

COMMENT 10: THANK YOU FOR MARKING THE END OF YOUR STORY.

ENGLISH: If ' #' or '30' or ' END' does appear in the last three words, make comment 10.

```
LOGIC:     Either  WORDS(L-2, L):  IF  25  THEN  10
                   WORDS(L-2, L):  IF  26  THEN  10
                   WORDS(L-2, L):  IF  27  THEN  10

                or WORDS(L-2, L):  IF  -25, -26, -27  THEN -10
```

Comment 10 should appear just when comment 9 does not. The truth table is:

1.	25	26	27	yes	
2.	25	26	-27	yes	
3.	25	-26	27	yes	
4.	25	-26	-27	yes	TRUTH TABLE
5.	-25	26	27	yes	
6.	-25	26	-27	yes	
7.	-25	-26	27	yes	
8.	-25	-26	-27	no	

The first three-line logic specification treats this as a case of three alternatives: if ' #' is found, or if '30' is found, or if ' END' is found, then make comment 10. Comparing this with the truth table, we see that "' #' found" gives a "yes" in rows 1, 2, 3, 4; "'30' found" gives a "yes" in rows 1, 2, 5, 6; and "' END' found" gives a "yes" in rows 1, 3, 5, 7. Row 8, the only remaining row, has a "no," so the logic specification is correct.

A positive number following the "THEN" in a logic command means, "Print the comment with this number if the pattern specification is satisfied." However, it is possible to insert a minussign in front of the comment number. This means, "Don't print the comment with this number if the pattern specification is satisfied. (Otherwise print it.)" Consequently, another way of writing the logic for comment 10 is

WORDS(L-2, L): IF -25, -26, -27 THEN -10

The negative comment number works in precisely the opposite manner of the positive comment number: the "print" switch is set to "on" at the beginning of the program. If one of the pattern specifications is satisfied, it is switched to "off" and stays "off." Another way of looking at it is to say that

WORDS(L-2, L): IF -25, -26, -27 THEN 10

and

WORDS(L-2, L): IF -25, -26, -27 THEN -10

are exactly complementary.

This example illustrates the fact that any comment can be specified in both a positive form and a negative form. Sometimes the negative form is shorter, but in general the positive form is easier to use and to understand.

11. PATTERNS: none

COMMENT 11: IF THIS WERE YOUR OWN OBIT, WOULD YOU BE SATISFIED WITH IT? IF NOT, WHY?

ENGLISH: After the other comments, make comment 11 unconditionally.

LOGIC: ALWAYS: 11

Using ALWAYS is convenient if you want a comment that does not depend on the words the student used in his story. Since comments print out according to how they are numbered, it will print out last if it is given the highest number.

12. PATTERNS: none

COMMENT 12: ARE YOU SURE YOU CAN'T FURTHER SHORTEN YOUR STORY? READ IT CAREFULLY TO SEE IF THERE ARE UNNECESSARY WORDS OR DETAILS YOU CAN OMIT. TRY AGAIN TO CUT IT TO 150 WORDS OR LESS.

ENGLISH: If the story exceeds 150 words in length, make comment 12.

LOGIC: MAX5=150: 12

JCAI will give the student 10 words leeway over the limit that you set. So it will print out comment 12 if the student's story is over 160 words long. If you do not wish to supply your own comment, there is a standard comment about story length. If you simply write

MAX5=150

the standard comment that will print out is:

YOUR STORY IS X WORDS LONG, WHICH IS TOO LONG FOR THE AVAILABLE SPACE. SEE IF YOU CAN REWORK IT CUTTING THE LENGTH TO 150 WORDS OR FEWER.

(where X is the number of words in the student's story).

SAMPLE FORMAT FOR PATTERNS, COMMENTS, AND LOGIC

The patterns must be first, then the comments, then the logic. Each section must be followed by the word 'END' on a separate line.

Comment lines (those with 'C' in the left margin) are ignored by the program and may be inserted wherever you wish. They are used below to separate comments and to give English explanations of the lines of logic.

```
C
C                              PATTERNS
C
001*ACHIEVE A MAXIMUM VELOCITY OF*
002*USS *
003*USS AMMAN*
004*USS COLLETT*
005*NEWPORT BEACH*
006*TODAY*
007*THIS MORNING*
008*AMMAN*
009*COLLETT*
010*LONG BEACH*
011*THREE*
012* 3*
013*FROM*
014*AFTER*
015*FOLLOWING*
016*BRAIN SURGERY*
017*ERNEST*
018*JOHN E*
019*JOSEPHINE*
020*PARENTS*
021*TRANSPORTATION*
022*"TRANSPORTATION*
023*PLANNED*
024*"PLANNED*
025* #*
026*30*
027* END*
END
C
C                              COMMENTS
C
001REPORT THE WEATHER CONDITIONS MORE SUCCINCTLY.  USE SYNONYMS
001FOR SUCH PHRASES AS "ACHIEVE A MAXIMUM VELOCITY OF."
C
002USS STANDS FOR UNITED STATES SHIP.  THEREFORE, IT IS USED
002ONLY AS PART OF A NAME, E.G. USS AMMAN.
```

```
C
003BE SURE TO REPORT NEAR THE BEGINNING OF THE STORY WHERE THE
003ACCIDENT OCCURRED.
C
004BE SURE TO REPORT NEAR THE BEGINNING OF THE STORY WHEN THE
004ACCIDENT OCCURRED.
C
005GOOD.  YOU HAVE IDENTIFIED THE DESTROYERS BY NAME, BASE AND
005FLOTILLA NUMBER EARLY IN THE STORY.  THIS IS IMPORTANT TO
005READERS WITH RELATIVES OR FRIENDS WHO MAY HAVE BEEN IN THE
005ACCIDENT.
C
0060NE OF THE MOST SENSITIVE AREAS IN AN OBITUARY IS THE CAUSE
0060F DEATH.  IF IT IS NOT KNOWN AND CANNOT BE LEARNED, AVOID
006IMPLYING THE CAUSE.
C
007IT IS CUSTOMARY TO INCLUDE THE NAMES OF THE PARENTS OF THE
007DECEASED, IF KNOWN.  HAVE YOU SPELLED THEM CORRECTLY?
C
008NEWSPAPER STYLE IS TO USE QUOTATION MARKS AROUND BOOK
008TITLES.  CHECK AP STYLE BOOK, IF IN DOUBT.
C
009HAVE YOU FINISHED THIS STORY?  I DON'T SEE THE END MARK.
C
010THANK YOU FOR MARKING THE END OF YOUR STORY.
C
011IF THIS WERE YOUR OWN OBIT, WOULD YOU BE SATISFIED WITH IT?
011IF NOT, WHY?
C
012ARE YOU SURE YOU CAN'T FURTHER SHORTEN YOUR STORY?  READ
012IT CAREFULLY TO SEE IF THERE ARE UNNECESSARY WORDS OR
012DETAILS YOU CAN OMIT.  TRY AGAIN TO CUT IT TO 150 WORDS OR
012LESS.
END
C
C                          LOGIC
C
C     IF 'ACHIEVE A MAXIMUM VELOCITY OF' APPEARS, THEN MAKE
C     COMMENT 1.
C
                IF  1  THEN  1
C
C     IF 'USS ' APPEARS BUT NEITHER 'USS AMMAN' NOR 'USS COLLETT'
C     APPEARS, THEN MAKE COMMENT 2.
C
                IF  2, -3, -4  THEN  2
C
C     IF 'NEWPORT BEACH' DOES NOT APPEAR IN THE FIRST 30 WORDS,
C     THEN MAKE COMMENT 3.
C
                WORDS(1, 30):  IF  -5  THEN  3
```

```
C
C     IF NEITHER 'TODAY' NOR 'THIS MORNING' APPEARS IN THE FIRST
C     PARAGRAPH, THEN MAKE COMMENT 4.
C
              PARAGRAPH(1):  IF  -6, -7  THEN  4
C
C     IF 'AMMAN' AND 'COLLETT' AND 'LONG BEACH' AND EITHER
C    'THREE' OR ' 3' APPEAR IN THE FIRST 50 WORDS, THEN MAKE
C     COMMENT 5.
C
              WORDS(1, 50):  IF  8, 9, 10, 11  THEN  5
              WORDS(1, 50):  IF  8, 9, 10, 12  THEN  5
C
C     IF 'FROM', 'AFTER' OR 'FOLLOWING' APPEARS IN THE SAME
C     SENTENCE WITH 'BRAIN SURGERY', THEN MAKE COMMENT 6.
C
              SENTENCE(*16*):  IF  13  THEN  6
              SENTENCE(*16*):  IF  14  THEN  6
              SENTENCE(*16*):  IF  15  THEN  6
C
C     IF 'ERNEST' OR 'JOHN E' AND 'JOSEPHINE' DO NOT APPEAR IN
C     THE SAME SENTENCE WITH 'PARENTS', THEN MAKE COMMENT 7.
C
              SENTENCE(*20*):  IF  -17, -18  THEN  7
              SENTENCE(*20*):  IF  -19  THEN  7
C
C     IF 'TRANSPORTATION' APPEARS BUT '"TRANSPORTATION' DOES NOT,
C     OR IF 'PLANNED' APPEARS BUT '"PLANNED' DOES NOT, THEN
C     MAKE COMMENT 8.
C
              IF  21, -22  THEN  8
              IF  23, -24  THEN  8
C
C     IF ' #' OR '30' OR ' END' DOES NOT APPEAR IN THE LAST
C     THREE WORDS, THEN MAKE COMMENT 9.
C
              WORDS(L-2, L):  IF  -25, -26, -27  THEN  9
C
C     IF ' #' OR '30' OR ' END' DOES APPEAR IN THE LAST THREE
C     WORDS, THEN MAKE COMMENT 10.
C
              WORDS(L-2, L):  IF  25  THEN  10
              WORDS(L-2, L):  IF  26  THEN  10
              WORDS(L-2, L):  IF  27  THEN  10
C
C     MAKE COMMENT 11 UNCONDITIONALLY.
C
              ALWAYS:  11
C
C     IF THE STORY EXCEEDS 150 WORDS IN LENGTH, THEN MAKE COMMENT 1
C
              MAX5=150:  12
C
END
```

PATTERNS

An example of the accepted format for patterns is

019*JOSEPHINE*

LENGTH OF PATTERNS. A pattern must be at least two characters long, and cannot be longer than 75 characters. Consequently if you are looking for a single character such as '%', it is necessary to insert a blank before or after it: '% ' is acceptable.

NUMBERING PATTERNS. Patterns must be numbered in strict sequence: 001, 002, 003, and so on. The numbers must be in the left margin; they cannot be indented.

USING '*' AS A DELIMITER. The pattern must be marked at the beginning and end by an asterisk. The asterisks are not part of the pattern. A pattern may be any sequence of characters not containing an asterisk. For example the pattern

027* END*

is made up of four characters: ' ', 'E', 'N', and 'D'. The rest of the line must be blank.

NUMBER OF LINES. Unlike a comment, a pattern cannot be continued on the next line. It must be on a single line.

CONSECUTIVE BLANKS IN PATTERNS. A pattern may not contain two consecutive blanks.

NULL PATTERNS. If you are not using a pattern anymore, you can make it a null pattern. For example, to nullify

019*JOSEPHINE*

replace it by its number

019

leaving the rest of the line blank. This will save you the work of renumbering all the patterns which follow. The program does not look for a null pattern but automatically assigns it the value "not found."

MAXIMUM NUMBER OF PATTERNS. The program allows for up to 150 patterns per story.

COMMENTS

An example of the accepted format for comments is

006ONE OF THE MOST SENSITIVE AREAS IN AN OBITUARY IS THE CAUSE
006OF DEATH. IF IT IS NOT KNOWN AND CANNOT BE LEARNED, AVOID
006IMPLYING THE CAUSE.

LENGTH OF COMMENTS. A comment may occupy any number of lines preceded by the same comment number. There are no beginning and end marks. Instead the first 60 characters (including blanks) that follow the comment number are accepted as part of the comment. If a line runs over 60 characters, the characters beyond 60 will not print.

NUMBERING COMMENTS. A comment with a lower number must precede a comment with a higher number. Thus all the lines numbered 001 must precede all the lines numbered 002, and so on. The numbers must be in the left margin; they cannot be indented.

ORDER OF PRINTING. Comments print out on the student's paper according to the order in which they are numbered. The comments about sentence, paragraph, and story length print out last.

NULL COMMENTS. You can omit a comment without having to renumber all the comments that follow. As in the case of null patterns, simply insert the number of the comment where the comment used to be, for example,

006

leaving the rest of the line blank. Leaving a few null comments at regular intervals is a good idea because it makes it easier later for you to insert new comments or shift the order in which the old ones are printed out.

MAXIMUM NUMBER OF COMMENTS. The program allows for up to 100 comments per story (counting null comments).